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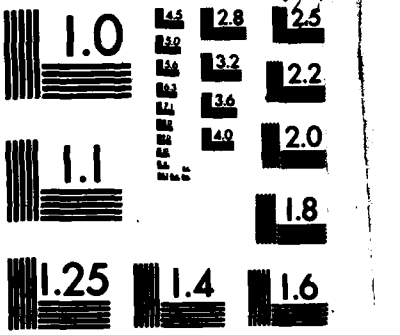

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A pilot study investigated the consequences of chronic exposure to 2450-MHz CW microwaves, or sham exposure, in a cold (18 °C) environment on the thermoregulatory responses, both behavioral and physiological, of squirrel monkeys. Two animals exposed to microwaves exhibited responses that were little different from those measured in animals residing in thermoneutral environments while two sham-exposed animals sustained thermoregulatory deficits. These tentative findings require replication.

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THERMOREGULATION: LONG-TERM MICROWAVE EFFECTS

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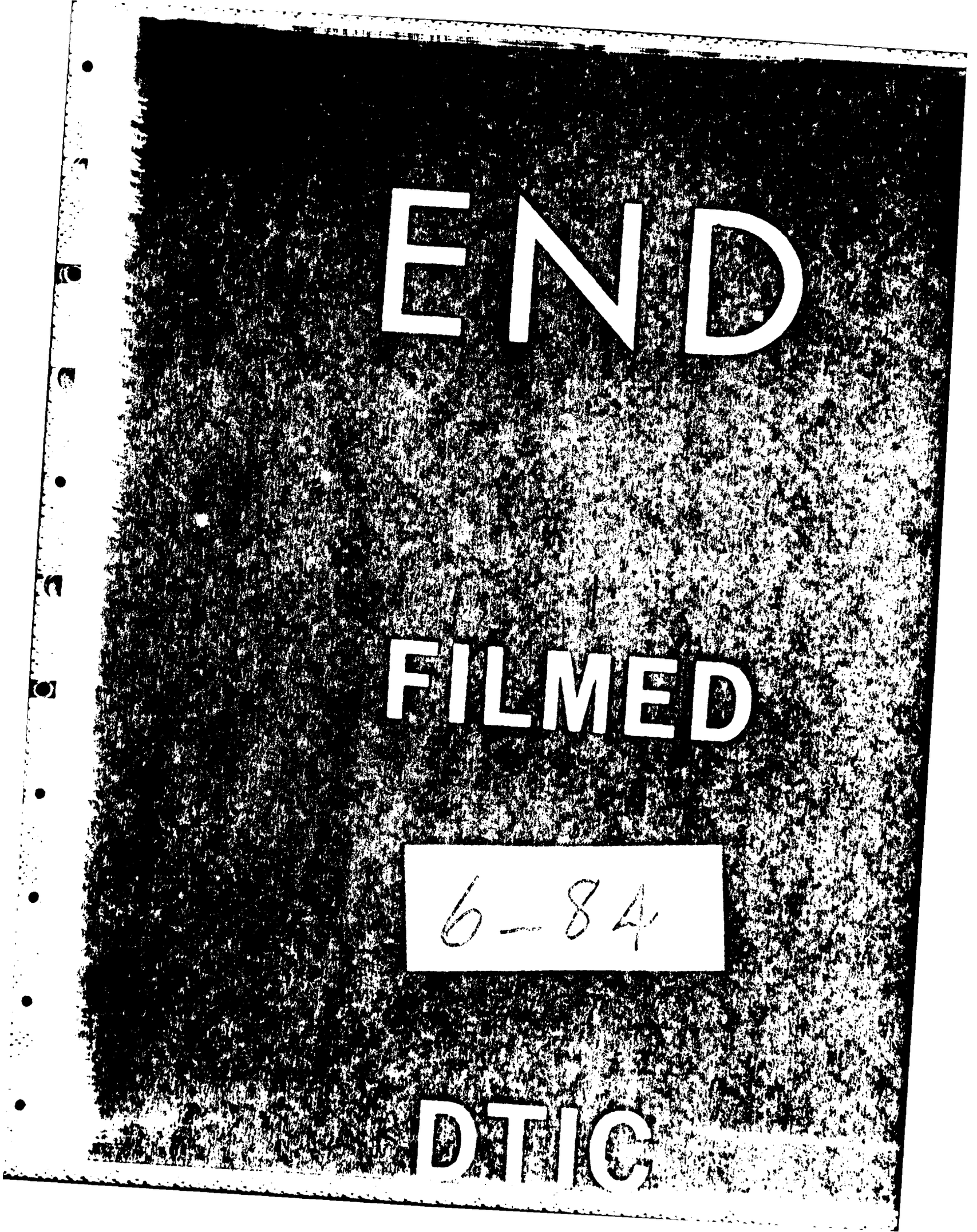
A pilot study was conducted to investigate the thermoregulatory consequences of chronic microwave, or sham, exposure at a controlled cold environmental temperature. Four adult male squirrel monkeys served as subjects. Two monkeys were exposed, in individual Plexiglas cylindrical cages, to 2450 MHz CW microwaves at a power density of 5 mW/cm^2, 40 h/wk for 15 weeks. Ambient temperature was constant at 18 °C. Two other monkeys were simultaneously sham-exposed to the same environmental temperature. Exposures were conducted from 0830 to 1630 hrs, Monday through Friday. Following the daily exposure period, all animals were returned to individual home cages in a vivarium maintained at 25±2 °C, where they received the daily food ration of Purina chow, fruit and vegetable supplements, and a milk-cereal mixture. Water only was available in the chronic exposure cages, provided by a drip system.

During the course of chronic exposure, each animal was administered 7 tests to assess thermoregulatory function, 4 physiological tests and 3 behavioral tests. Each type of test involved standardized protocols. The behavioral test, 240 min in duration, permitted the animal to select its preferred environmental temperature (T_a) by choosing between two available air temperatures, 10 and 50 °C. In addition to the measure of T_a selected, colonic temperature and four representative skin temperatures (abdomen, tail, leg, and foot) were also measured continuously. The physiological test involved a series of T_a challenges to 20, 26.6, 29.9, 33.3, and 36.6 °C to assess levels of heat production and heat loss responses at each T_a. Measured variables included metabolic heat production (calculated from oxygen consumption),

colonic temperature, four representative skin temperatures (abdomen, tail, leg, and foot), and sweating rate from the foot. Whole-body thermal conductance was assessed from the core-to-ambient temperature gradient.

The data from individual tests on each animal were compared with extensive pre-chronic-exposure data. During an 8-week post-exposure follow-up period, two additional tests of each type were conducted. Since the number of animals in each treatment group was limited to two, no statistical analyses could be performed on the data. Trends in the data indicated that the cold-exposed animals concomitantly exposed to microwaves derived clear benefit from the exogenously-supplied energy which was, at 5 mW/cm^2, the equivalent of ~15% of the resting metabolic heat production. They maintained a normal deep body temperature by vasoconstricting the tail while maintaining an otherwise normal skin temperature, and by strategic adjustments in metabolic rate. On the other hand, thermoregulation in the sham exposed animals appeared to have been compromised, not only during the 15 weeks of chronic cold exposure but still throughout the 8-week follow-up period. The latter was particularly evident in the data from the behavioral tests during which these animals selected a T_a 1 to 2 °C above their normal (baseline) preference in order to achieve a normal colonic temperature during behavioral thermoregulation. All of these tentative findings await replication at some future time.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